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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/672,151	09/26/2003	Keren Jacobs	LAMIP178/P1189	8126
22434	7590	12/30/2004	EXAMINER	
BEYER WEAVER & THOMAS LLP P.O. BOX 70250 OAKLAND, CA 94612-0250			TRAN, BINH X	
			ART UNIT	PAPER NUMBER
			1765	

DATE MAILED: 12/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/672,151

Applicant(s)

JACOBS ET AL.

Examiner

Binh X Tran

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 September 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 15 is/are rejected.
- 7) ☒ Claim(s) 14 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 9/26/03; 2/17/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Interpretations

1. Claim 11 is a product-by-process claim. According to the MPEP 2113, "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production". Thus, the examiner will not give any patentable weight on the method to make the semiconductor chip in claim 11.
2. Claim 12 is an apparatus claim having the manner of operation according to claim 1. According to the MPEP 2114, "A claim containing a 'recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus' if the prior art apparatus teaches all the structural limitations of the claim". Thus, the examiner will not give any patentable weight on the manner of operation on the apparatus.

Claim Objections

3. Claim 14 is objected to because of the following informalities: In claim 14, "the third etch plasma composition more aggressive" and "the "second plasma composition more aggressive" appears to have incorrect grammar. Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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5. Claims 11-12, 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 11 is indefinite because the applicants fail to disclose the specific structure limitation of the semiconductor chip.

Claim 12 is indefinite because applicants fail to disclose the structure limitation with respect to the apparatus.

Claim 15 recites the limitations "the first etch plasma", "the second etch plasma" and "the third etch plasma" in claim 1. There are insufficient antecedent basis for these limitations in the claim.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-7, 10-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Bhardwaj et al. (US 6,051,503).

Respect to claim 1, Bhardwaj discloses a etching feature in an etch layer through a mask (22) over a substrate, comprising:

placing a substrate in a process chamber (Fig 1);

providing a etch plasma to the process chamber;

etching a feature in the etch layer with the etch plasma;

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ramping at least one etching parameter during the etching of the feature to optimize plasma parameters to the changing etch depth and etching with the ramped plasma until the feature is etched to a feature depth (col. 8-9, Fig 9).

Respect to claim 2, Bhardwaj teaches to provide a ramp that increases the overall selectivity to the mask by ramping from recipe with higher mask selectivity to lower selectivity (col. 9 lines 5-25). Respect to claims 3-4, Bhardwaj discloses the etch layer is a single uniform layer. Respect to claim 5, Bhardwaj discloses the ramping occurs over a time period of greater than 30 seconds (Fig 19b). Respect to claim 6, Bhardwaj discloses the ramping occurs greater than 50% of the duration of the etch (Fig 9i, 9ii). Respect to claim 7, Bhardwaj discloses the ramping is a non-linear ramping (col. 10 lines 57-60). Respect to claim 10, Bhardwaj discloses the ramping decreases the etch selectivity between the etch layer and the mask (col. 9 lines 15-19). Respect to claim 11, Bhardwaj discloses a semiconductor chip formed by the method as discussed above. Respect to claim 12, Bhardwaj discloses an apparatus for performing the method as discussed above (Fig 1).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bhardwaj in view of Wang et al. (US 6,040,619).

Respect to claim 8, Bhardwaj fails to disclose the etch layer is a dielectric layer. In a semiconductor process, Wang discloses the etch layer is a dielectric layer (col. 4). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Bhardwaj in view of Wang by using dielectric layer because this layer is necessary to protect and insulate the substrate during semiconductor process.

Respect to claim 9, Bhardwaj fails to disclose that the ramping increase etch aggressive with respect to etch stop. Wang discloses a process to increase etch aggressive with respect to etch stop (col. 4 line 55 to col. 5 line 5). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Bhardwaj in view of Wang by increasing etch aggressive with respect to etch stop because it will reduce the etching time for the etch stop.

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11. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stolze (US 6,449,038) in view of Bhardwaj et al. (US 6,051,503).

Respect to claim 13, Stolze discloses an apparatus for etching comprising a plasma processing chamber comprising:

- a chamber wall forming a plasma processing chamber enclosure;

- a substrate support (52) for supporting a substrate;

- a pressure regulator for regulating the pressure in the plasma processing chamber enclosure;

- at least one electrode for providing power (RF power) to the plasma processing chamber enclosure for sustaining a plasma (col. 7 lines 10-25);

- a gas inlet (38) for providing gas into the plasma processing chamber;

- a gas outlet (i.e. exhaust 42) for exhausting gas from the plasma processing chamber enclosure;

- a gas source (36) in fluid connection with the gas inlet (38);

- a controller controllably connected to at least one of the gas source, the at least one electrode, the pressure regulator, gas inlet/outlet, comprising:

 - at least one processor (i.e. CPU); and

 - computer readable media (i.e., disk drive) comprising computer readable code (i.e. computer program) (See col. 10, Fig 5).

Stolze fails to disclose that the computer readable code is used for ramping at least one the parameter during the etching of the feature to optimize plasma parameters according to etch depth. In a plasma etching method, Bhardwaj teaches ramping at

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least one etching parameter during the etching of the feature to optimize plasma parameters to the changing etch depth and etching with the ramped plasma until the feature is etched to a feature depth (col. 8-9, Fig 9). It would have been obvious to one having ordinary skill in the art, at the time of invention to modify Stolze in view of Bhardwaj by ramping the etching parameters because this technique provide more control of the etching process.

Allowable Subject Matter

12. Claim 14 would be allowable if rewritten or amended to overcome the objection set forth in this Office action.

13. The following is a statement of reasons for the indication of allowable subject matter: The cited prior arts does not teach or fairly suggest that the third etch plasma composition is more aggressive with respect to etch stop than the second etch plasma composition and the second plasma composition is more aggressive with respect to etch stop than the first etch plasma composition in conjunction with all other limitation in the claim.

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Binh X Tran whose telephone number is (571) 272-1469. The examiner can normally be reached on Monday-Thursday and every other Friday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Binh Tran

Binh X. Tran